

U.S. ARMY CORPS OF ENGINEERS SACRAMENTO DISTRICT

ENERGY SAVINGS OPPORTUNITY SURVEY

DUGWAY PROVING GROUND

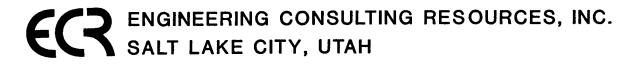
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EXECUTIVE SUMMARY

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ENERGY SAVINGS OPPORTUNITY SURVEY

for the

ENERGY ENGINEERING ANALYSIS PROGRAM

DUGWAY PROVING GROUND Dugway, Utah

Contract No. DACA05-86-0088

For

Sacramento District
CORPS OF ENGINEERS

September 1987



ENGINEERING CONSULTING RESOURCES, INC. 4609 South 2300 East, Suite 101 Salt Lake City, Utah 84117 (801) 277-7879

DEPARTMENT OF THE ARMY

CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS P.O. BOX 9005 CHAMPAIGN, ILLINOIS 61826-9005

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EXECUTIVE SUMMARY

An Energy Savings Opportunity Survey (ESOS) has been completed for the U.S. Army Dugway Proving Ground facility located at Dugway, Utah. This work, conducted as part of the Energy Engineering Analysis Progarm (EEAP), included: a review of previous studies; an evaluation of selected projects and energy conservation opportunities (ECOs); a site survey of 53 selected buildings to identify additional ECOs; analysis of the energy and cost savings and ECOs project costs; and preparation of project documentation for funding and implementation.

Over 150 different energy conservation opportunities (ECOs), shown on pages 2 through 5, were identified during this ESOS. Economic analysis indicates that only 106 of these ECOs had a savings-to-investment (SIR) ratio greater than one. The estimated savings from the 106 ECOs was nearly 45,000 MBTU or 15% of the FY84-85 overall energy (MBTU) usage. Cost savings for the 106 ECOs are estimated to approach \$271,000 or 9% of the same period. Most all of the ECOs identified save fuel oil rather than electricity. Total savings from the fuel oil ECOs exceed \$260,000 or over 19% of the FY84-85 fuel oil usage.

Seven projects were selected by Dugway Proving Ground for funding and implementation. These projects, outlined on pages 6 - 7 with supporting data starting on page 8, are estimated to save 44,000 MBTUs and over \$267,900 annually. The estimated cost for design and construction of these projects is approximately \$1,197,000.

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ECO PROJECT More Efficient Lighting Source Solar DHW System	14 47	LOCATION				English Village	English Village		English Village	English Village		i		English Village	English Village			English Village	English Village		English Village		English Village	English Village	Fries Park	Fries Park	Fries Park	
ECO PROJECT More Efficient Lighting Source Solar DHW System	14 47	LOCATION				English Village	English Village			English Village	English Village	Annex	English Village	English Village			English Village	English Village	English Village		English Village		English Village	English Village	Fries Park			
ECO PROJECT More Efficient Lighting Source Solar DHW System	14 47					English Village	English Village				English Village	Annex	English Village	English Village			English Village	English Village	English Village		English Village		English Village		a			
ECO PROJECT More Efficient Lighting Source Solar DHW System	14 47				English Village		English Village				English Village	Annex	English Village				English Village	English Village	English Village		English Village		English Village		a			
ECO PROJECT More Efficient Lighting Source Solar DHW System	14 47	NAME LOCATION			English Village		English Village				English Village	Annex	English Village				English Village	English Village			English Village		English Village		a			
ECO PROJECT More Efficient Lighting Source Solar DHW System	14 47				English Village		English Village				English Village	Annex	English Village				English Village	English Village			English Village		English Village		a			
ECO PROJECT More Efficient Lighting Source Solar DHW System	14 47				English Village		English Village				English Village	Annex	English Village				English Village	English Village			English Village		English Village		a			
ECO PROJECT More Efficient Lighting Source Solar DHW System	14 47		tric Shop		English Village	Fire Station English Village				Station Hospital English Village		i		Dugway Mall English Village	Administration Bldg English Village	Provost Marshal Office English Village		fice English Village	Craft Shop English Village	Auto Motor Maint Shop English Village	English Village	Steam Cleaning Facility English Village	English Village	gp	a	ply	Supply Office Bldg Fries Park	Communications Storage Fries Park .
ECO PROJECT More Efficient Lighting Source Solar DHW System	14 47	# NAME	Electronic/Electric Shop	Post Chapel	Gymnasium English Village	Fire Station	Military Mens Quarters English Village	DPG Community Club	Child Care Center	Station Hospital	Hospital Dormitory English Village	DPG Community Club Annex	EM Barracks & Mess English Village	Dugway Mall	Administration Bldg	Provost Marshal Office	Post Headquarters English Village	Transportation Office English Village	Craft Shop	Auto Motor Maint Shop	FE Offices & Shop English Village	Steam Cleaning Facility	Heating Plant English Village	Operations Bldg	Supply Warehouse	Self Service Supply	Supply Office Bldg	Communications Storage
SOURCE STRICTERN Lighting Source Solar DHW System	14 47	# NAME	Electronic/Electric Shop	Post Chapel	Gymnasium English Village	Fire Station	Military Mens Quarters English Village	DPG Community Club	Child Care Center	Station Hospital	Hospital Dormitory English Village	DPG Community Club Annex	EM Barracks & Mess English Village	Dugway Mall	Administration Bldg	Provost Marshal Office	Post Headquarters English Village	Transportation Office English Village	Craft Shop	Auto Motor Maint Shop	FE Offices & Shop English Village	Steam Cleaning Facility	Heating Plant English Village	Operations Bldg	Supply Warehouse	Self Service Supply	Supply Office Bldg	Communications Storage
ECO PROJECT More Efficient Lighting Source Solar DHW System	14 47	NAME	Electronic/Electric Shop		Gymnasium English Village		English Village				English Village	Annex	English Village				English Village	English Village			English Village		English Village		a			
ECO PROJECT More Efficient Lighting Source Solar DHW System	14 47	# NAME	Electronic/Electric Shop	Post Chapel	Gymnasium English Village	Fire Station	Military Mens Quarters English Village	DPG Community Club	Child Care Center	Station Hospital	Hospital Dormitory English Village	DPG Community Club Annex	EM Barracks & Mess English Village	Dugway Mall	Administration Bldg	Provost Marshal Office	Post Headquarters English Village	Transportation Office English Village	Craft Shop	Auto Motor Maint Shop	FE Offices & Shop English Village	Steam Cleaning Facility	Heating Plant English Village	Operations Bldg	Supply Warehouse	Self Service Supply	Supply Office Bldg	Communications Storage
ECO PROJECT More Efficient Lighting Source Solar DHW System	14 47	# NAME	Electronic/Electric Shop	Post Chapel	Gymnasium English Village	Fire Station	Military Mens Quarters English Village	DPG Community Club	Child Care Center	Station Hospital	Hospital Dormitory English Village	DPG Community Club Annex	EM Barracks & Mess English Village	Dugway Mall	Administration Bldg	Provost Marshal Office	Post Headquarters English Village	Transportation Office English Village	Craft Shop	Auto Motor Maint Shop	FE Offices & Shop English Village	Steam Cleaning Facility	Heating Plant English Village	Operations Bldg	Supply Warehouse	Self Service Supply	Supply Office Bldg	Communications Storage

ENERGY SAVINGS OPPORTUNITY SURVEY PROJECTS

Project #1 - The three ECOs selected for this project will be implemented at eight DPG facilities and includes: modifications to the existing automatic temperature controls, permanent night setback temperature controls, and modifications to existing light switching. The project will be funded under the Quick Return on Investment Program (QRIP).

MBTU	Cost	Project	
Savings	Savings	Cost	
8,344	\$ 50,085	\$ 68,795	Simple Payback: 1.4 yrs

Project #2 - The four ECOs selected for this project will be implemented at 39 DPG facilities and includes: night setback temperature controls, an economizer, pipe and tank insullation, and automatic door closers. The project will be funded under Office, Secretary of Defense Productivity Investment Funding (OSD PIF).

MBTU Savings	Cost Savings	Project Cost				
17,215	\$104,269	\$316,883	Simple	Payback:	3.0	yrs

Project #3 - The ECO selected for this project will be implemented at six DPG facilities. The ECO includes roof and/or wall insulation. The project will be funded under Office, Secretary of Defense Productivity Investment Funding (OSD PIF).

MBTU Savings	Cost Savings	Project Cost	
4,958	\$ 29,312	\$ 84,438	Simple Payback: 2.9 yrs

Project #4 - The ECO selected for this project will be implemented at nine DPG facilities. The ECO includes roof and/or wall insulation. The project will be funded as a Low Cost/No Cost type project.

MBTU Savings	Cost Savings	Project Cost	
1,663	\$ 9,825	\$141,361	Simple Payback: 14.4 yrs

ESOS PROJECTS - CONTINUED

Project #5 - The ECO selected for this project will be implemented at nine DPG facilities. The ECO includes interior storm windows. The project will be funded as a Low Cost/No Cost type project.

MBTU Savings	Cost Savings	Project Cost	
1,858	\$ 10,994	\$116,708	Simple Payback: 10.6 yrs

Project #6 - The ECO selected for this project will be implemented at one DPG facility. The ECO includes infrared oil-fired heaters. The project will be funded as a Low Cost/No Cost type project.

MBTU Savings	Cost Savings	Project Cost	
2,031	\$ 12,959	\$154,431	Simple Payback: 11.9 yrs

Project #7 - The ten ECOs selected for this project will be implemented at 18 DPG facilities and includes: weather stripping and caulking, replacement of incandescent light fixtures, infrared oil-fired heaters, shower flow restrictors, heat recovery systems, swimming pool cover, motor speed controls, evaporative cooler controls, fluorescent ballast controls, and photoelectric light switches. The project will be funded as a Low Cost/No Cost type project.

MBTU	Cost	Project	
Savings	Savings	Cost	
8,385	\$ 50,498	\$314,490	Simple Payback: 6.2 yrs

REF: PROJ #1

PROJECT: PROJECT #1 FUNDING = QRIP

DATE: AUG 1987

BY: CMY

DESCRIPTION:

PROJECT #1 :CONTROL AND LIGHTING MODIFICATIONS

QRIP

BLDG. #	ECO #	CONSTRUCTION COST	CONTRACT COST	TOTAL COST
2028	42	\$10,264	\$1,232	\$11,496
4110	42	\$14,878	\$1,785	\$16,663
4120	42	\$10,182	\$1,222	\$11,405
5222	42	\$24,542	\$2,945	\$27,488
1006	49	\$686	\$82	\$768
4053	49	\$411	\$49	\$460
5300	49	\$359	\$43	\$402
4090	61	\$99	\$12	\$111
TOTALS		\$61,424	\$7,371	\$68,795

PROJECT: PROJECT #1 FUNDING = QRIP

REF: PROJ #1 DATE: AUG 1987

BY: CMY

DESCRIPTION:

PROJECT #1 : CONTROL AND LIGHTING MODIFICATIONS

BLDG. #	ECO #	THERMAL MBTU	ENERGY DOLLARS		CTRICAL MBTU	ENERGY DOLLARS	TOTAL SAVINGS
2028	42	1023	\$6,047	0	Ø	\$0	\$6,047
4110	42	2210	\$13,064	55313	189	\$1,830	\$14,894
4120	42	3811	\$21,346	0	Ø	\$0	\$21,346
5222	42	422	\$2,494	0	Ø	\$0	\$2,494
1 006	49	503	\$2,972	Ø	0	\$0	\$2,972
4053	49	2.1	\$123	Ø	Ø	\$0	\$123
5300	49	351	\$2,072	2043	7	\$68	\$2,140
4090	61	Ø	\$0	2097	7	\$69	\$69
TOTALS		8141	\$48,118	59453	203	\$1,967	\$50,085
TOTAL MBT	·U =	8141	THERMAL +	203	ELECT. =	8344	TOTAL MBTU

REF: PROJ #2

PROJECT: PROJECT #2 FUNDING = OSD-PIF

DATE: AUG 1987

BY: CMY

DESCRIPTION:

PROJECT #2 :NIGHT SETBACK, ECONOMIZER, INSULATION AND AUTOMATIC

	OSD-PIF	DOOR CLOSERS		
BLDG. #	ECO #	CONSTRUCTION COST	CONTRACT COST	TOTAL COST
1010	17	\$7,439	\$893	\$8,332
1012	17	\$3,025	\$363	\$3,388
1020	17	\$2,837	\$340	\$3,177
1040	17	\$622	\$75	\$697
2032	17	\$726	\$87	\$813
3046	17	·\$1,037	\$124	\$1,161
3056	17	\$2,454	\$295	, \$2,749
3080	17	\$6,490	\$779	\$7,269
3096	17	\$1,367	\$164	\$1,531
3096	53	\$1,426	\$171	\$1,597
4003	17	\$1,752	\$210	\$1,962
4003	54	\$3,040	\$365	\$3,405
4006	17	\$1,665	\$200	\$1,865
4010	17	\$9,336	\$1,120	\$10,456
4090	17	\$311	\$37	\$348
4117	17	\$3,971	\$477	\$4,448
4126	17	\$15,125	\$1,815	\$16,940
4132	17	\$484	\$58	\$542
4204	17	\$1,353	\$162	\$1,515
4220	17	\$1,453	\$174	\$1,627
CLIRTATAL	THIS PAGE	\$65,913	\$7,909	\$73,822

PROJECT: PROJECT #2

PAGE 2

REF: PROJ #2 DATE: AUG 1987

BY: CMY

DESCRIPTION:

PROJECT #2 :NIGHT SETBACK, ECONOMIZER, INSULATION AND AUTOMATIC

	CONSTRUCTION	CONTRACT COST	TOTAL COST
BLDG. # ECO # 	COST		
SUBTOTAL PREV PAGE	\$65,913	\$7,909	\$73,822
4233 17	\$7,081	\$850	\$7,931
5100 17	\$755	\$91	\$846
5111 17	\$14,579	\$1,750	\$16,329
5212 17	\$8,823	\$1,059	\$9,882
5212 54	\$2,027	\$243	\$2,270
5230 17	\$15,694	\$1,883	\$17,577
5234 17	\$18,549	\$2,226	\$20,775
5236 17	\$15,627	\$1,875	\$17,502
5236 53	\$1,088	\$131	\$1,219
5240 17	\$1,634	\$196	\$1,830
5314 17	\$52,174	\$6,261	\$58,435
5326 17	\$3,715	\$446	\$4,16
5330 17	\$13,362	\$1,603	\$14,965
5438 17	\$4,411	\$529	\$4,940
5450 17	\$10,828	\$1,299	\$12,12
5450 19	\$8,111	\$ 973	\$9,084
5454 17	\$910	\$109	\$1,01
5460 17	\$15,554	\$1,866	\$17,420
5470 17	\$8,163	\$980	\$9,14
SUBTOTAL PAGES 1&2	\$269,003	\$32,279	\$301,282

PROJECT: PROJECT #2

PAGE 3

REF: PROJ #2 DATE: AUG 1987

BY: CMY

DESCRIPTION:

PROJECT #2 :NIGHT SETBACK, ECONOMIZER, INSULATION AND AUTOMATIC

BLDG. #	ECO #	CONSTRUCTION COST	CONTRACT COST	TOTAL COST
SUBTOTAL	PAGES 1&2	\$269,003	\$32,279	\$301,282
5470	54	\$6,080	\$730	\$6,810
5474	17	\$1,821	\$218	\$2,039
6002	17	\$428	\$51	\$479
6008	17	\$1,029	\$123	\$1,152
6015	17	\$2,193	\$263	\$2,456
6016	53	\$669	\$80	\$749
6048	17	\$1,709	\$205	\$1,914
TOTAL PA	GES 1,2&3	\$282,934	\$33,949	\$316,883

PROJECT: PROJECT #2 FUNDING = OSD-PIF

REF: PROJ #2 DATE: AUG 1987

BY: CMY

DESCRIPTION:

PROJECT #2 :NIGHT SETBACK, ECONOMIZER, INSULATION AND AUTOMATIC

	OSD-PIF	טטטא ט	LUSERS				
BLDG. #	ECO #	THERMAL MBTU	ENERGY DOLLARS	ELEC		NERGY DOLLARS	TOTAL SAVINGS
1010	17	832	\$4,918	14462	49	\$479	\$5,396
1012	17	62	\$365	463	2	\$15	\$380
1020	17	704	\$4,160	3777	13	\$125	\$4,285
1040	17	82	\$487	621	2	\$21	\$508
2032	17	343	\$2,026	1195	4	\$40	\$2,065
3046	17	180	\$1,065	1909	. 7	\$63	\$1,128
3056	17	228	\$1,350	2851	10	\$94	\$1,445
3080	17	142	\$839	265	1	\$9	\$848
3096	17	171	\$1,012	1296	4	\$43	\$1,055
3096	53	1 98	\$1,173	0	0	\$0	\$1,173
4003	17	63	\$371	128	Ø	\$4	\$375
4003	54	106	\$629	Ø	Ø	\$0	\$629
4006	17	189	\$1,117	1040	4	\$34	\$1,151
4010	17	319	\$1,885	1259	4	\$42	\$1,927
4090	17	86	\$509	1034	4	\$34	\$543
4117	17	579	\$3,424	5123	17	\$170	\$3,594
4126	17	273	\$1,616	4340	15	\$144	\$1,760
4132	17	332	\$1,960	3885	13	\$129	\$2,089
4204	17	667	\$3,944	2780	9	\$92	\$4,036
4220	17	565	\$3,340	7086	24	\$234	\$3,574
SUBTOTAL	. THIS PAGE	6121	\$36,190	53514	183	\$1,772	\$37,961

PROJECT: PROJECT #2

PAGE 2

REF: PROJ #2 DATE: AUG 1987

BY: CMY

DESCRIPTION:

PROJECT #2 :NIGHT SETBACK, ECONOMIZER, INSULATION AND AUTOMATIC

	000 121						
BLDG.	# ECO #		ENERGY DOLLARS			ENERGY DOLLARS	TOTAL SAVINGS
SUBTOTA	AL PREV PAGE	6121	\$36,190	53514	183	\$1,772	\$37,961
4233	17	290	\$1,714	1386	5	\$45	\$1,760
5100	17	167	\$990	Ø	Ø	\$0	\$990
5111	17	661	\$3,909	3358	11	\$111	\$4,020
5212	17	252	\$1,489	Ø	Ø	\$0	\$1,489
5212	54	99	\$587	Ø	. 0	\$0	\$587
5230	17	376	\$2,225	866	3	\$29	\$2,254
5234	17	510	\$3,013	Ø	Ø	\$0	\$3,013
5236	17	1285	\$7,597	23703	81	\$784	\$8,381
5236	53	63	\$371	Ø	0	\$0	\$371
5240	17	286	\$1,690	Ø	Ø	\$Ø	\$1,690
5314	17	1341	\$7,926	3842	13	\$127	\$8,053
5326	17	300	\$1,776	0	0	\$0	\$1,776
5330	17	832	\$4,921	Ø	Ø	\$0	\$4,921
5438	17	99	\$584	871	3	\$29	\$613
5450	17	337	\$1,990	8727	30	\$289	\$2,279
5450	19	Ø	\$0	69793	238	\$2,310	\$2,310
5454	17	196	\$1,159	5201	18	\$172	\$1,331
5460	17	1364	\$8,064	8609	29	\$285	\$8,349
5470	17	330	\$1,953	2039	7	\$67	\$2,020
SUBTOT	AL PAGES 1&2	14909	\$88,148	181909	621	\$6,021	\$94,168

PROJECT: PROJECT #2

PAGE 3

REF: PROJ #2 DATE: AUG 1987

BY: CMY

DESCRIPTION:

PROJECT #2 :NIGHT SETBACK, ECONOMIZER, INSULATION AND AUTOMATIC

	050-61	F	ט אטטע	COOCINO				
BLOG. #	ECO :		THERMAL MBTU	ENERGY DOLLARS	ELE	CTRICAL MBTU	ENERGY DOLLARS	TOTAL SAVINGS
SUBTOTAL	PAGES	1&2	14909	\$88,148	181909	621	\$6,021	\$94,168
5470	54		333	\$1,969	0	Ø	\$0	\$1,969
5474	17		447	\$2,645	0	0	\$0	\$2,645
6002	17		69	\$410	604	2	\$20	\$430
6008	17		312	\$1,846	2718	9	\$90	\$1,936
6016	17		220	\$1,300	1244	4	\$41	\$1,341
6016	53		15	\$89	0	0	\$0	\$89
6048	17					16	\$158	\$1,690
				\$97,939		653	\$6,330	\$104,269
TOTAL MB	TU =		16562	THERMAL +	653	ELECT. =	17215	TOTAL MBTU

ENGINEERING CONSULTING RESOURCES, INC. Consulting Engineers 4609 South 2300 East, Salt Lake City, Utah, 84117 (801) 277-7879

REF: PROJ #3

PROJECT: PROJECT #3 FUNDING = OSD-PIF

DATE: AUG 1987

BY: CMY

DESCRIPTION:

PROJECT #3 : ROOF AND/OR WALL INSULATION

1020 1 \$5,198 \$624 \$5, 4010 1 \$7,658 \$919 \$8, 4132 1 \$2,772 \$333 \$3,	ECO #	CONSTRUCTION COST	CONTRACT COST	TOTAL COST
1020 1 \$5,198 \$624 \$5, 4010 1 \$7,658 \$919 \$8, 4132 1 \$2,772 \$333 \$3,	1	\$1,468	\$176	\$1,544
4132 1 \$2,772 \$333 \$3,	·	·	\$624	\$5,822
7102	1	\$7,658	\$919	\$8,577
5470 1 \$37,604 \$4,513 \$42,	1	\$2,772	\$333	\$3,105
	1	\$37,604	\$4,513	\$42,117
5474 1 \$20,692 \$2,483 \$23,	1	\$20,692	\$2,483	\$23,175
5474		1 1 1	ECO # COST 1 \$1,468 1 \$5,198 1 \$7,658 1 \$2,772 1 \$37,604	ECO # COST COST 1 \$1,468 \$176 1 \$5,198 \$624 1 \$7,658 \$919 1 \$2,772 \$333 1 \$37,604 \$4,513

\$75,390 \$9,048 \$84,438

TOTALS

ENGINEERING CONSULTING RESOURCES, INC. Consulting Engineers 4609 South 2300 East, Salt Lake City, Utah, 84117 (801) 277-7879

REF: PROJ #3 DATE: AUG 1987

PROJECT: PROJECT #3 FUNDING = OSD-PIF

BY: CMY

DESCRIPTION:

PROJECT #3 : ROOF AND/OR WALL INSULATION

OSD-PIF

		THERMAL	ENERGY	ELECT	RICAL ENER		TOTAL
BLDG. #	ECO #	MBTU	DOLLARS	KWH	MBTU DOL	_LARS 	SAVING9
1006		194	\$1,149	Ø	Ø	\$0	\$1,149
1020	1	631	\$3,729	Ø	Ø	\$0	\$3,729
4010	1 .	530	\$3,131	0	Ø	\$0	\$3,131
4132	1	208	\$1,230	Ø	Ø	\$Ø	\$1,230
5470	1	2735	\$16,171	ø [:]	Ø	\$0	\$16,171
5474	1	660	\$3,902	Ø	Ø	\$0	\$3,902
TOTALS		4958	\$29,312	Ø	ø	\$ 0	\$29,312

REF: PROJ #4 DATE: AUG 1987

PROJECT: PROJECT #4 FUNDING = LOW COST/NO COST

BY: CMY

DESCRIPTION:

PROJECT #4 : ROOF AND/OR WALL INSULATION

BLDG. #	ECO #	CONSTRUCTION COST	CONTRACT COST	TOTAL COST
1010	1	\$8,910	\$1,069	\$9,979
3080	1	\$6,256	\$751	\$7,007
4005	1	\$8,483	\$1,018	\$9,501
4126	1	\$9,646	\$1,157	\$10,803
5450	1	\$32,027	\$3,843	\$35,870
5460	1	\$25,329	\$3,039	\$28,368
6008	1	\$19,860	\$2,383	\$22,243
6016	1	\$7,445	\$893	\$8,338
6048	1	\$8,258	\$991	\$9,249
TOTALS	. — <u></u>	\$126,214	\$15,147	\$141,361

REF: PROJ #4

PROJECT: PROJECT #4 FUNDING = LOW COST/NO COST - DATE: AUG 1987

BY: CMY

DESCRIPTION:

PROJECT #4 :ROOF AND/OR WALL INSULATION

BLDG. #	ECO #	THERMAL MBTU	ENERGY DOLLARS	ELECT		RGY LARS	- ALITHOC
						~	
1010	1	139	\$821	Ø	Ø	\$0	\$821
3080	1	102	\$601	Ø	Ø	\$0	\$601
4006	1	81	\$480	Ø	Ø	\$0	\$480
4126	1	121	\$713	Ø	Ø	\$0	\$713
5450	1	316	\$1,868	Ø	Ø	\$0	\$1,868
5460	1	440	\$2,600	Ø	Ø	\$0	\$2,600
6008	1	210	\$1,243	0	Ø	\$0	\$1,243
6016	1	114	\$672	0	Ø	\$0	\$672
6048	1	140	\$827	0	0	\$Ø 	\$827
TOTALS		1663	\$9,825	0	Ø	\$0	\$9,825
TOTAL MBT	·U =	1663	THERMAL +	Ø ELI	ECT. =	1663	TOTAL MBTU

ENGINEERING CONSULTING RESOURCES, INC. Consulting Engineers 4609 South 2300 East, Salt Lake City, Utah, 84117 (801) 277-7879

REF: PROJ #5 DATE: AUG 1987 PROJECT: PROJECT #5 FUNDING = LOW COST/NO COST

BY: CMY

DESCRIPTION:

PROJECT #5 :INTERIOR STORM WINDOWS

BLDG. #	ECO #	CONSTRUCTION COST	CONTRACT COST	TOTAL COST
4126	2	\$7,312	\$877	. \$8,190
4204	2	\$4,900	\$588	\$5,488
5222	2	\$14,331	\$1,720	\$16,051
5234	2	\$11,674	\$1,401	\$13,075
5460	2	\$27,262	\$3,271	\$30,534
5470	2	\$33,046	\$3,966	\$37,012
5474	2	\$1,743	\$209	\$1,952
6008	2	\$3,144	\$377	\$3,521
6048	2	\$790	\$95	\$885
		·		
TOTALS		\$104,203	\$12,505	\$116,708

REF: PROJ #5

PROJECT: PROJECT #5 FUNDING = LOW COST/NO COST DATE: AUG 1987

BY: CMY

DESCRIPTION:

PROJECT #5 : INTERIOR STORM WINDOWS

BLDG. #	ECO		L ENERGY DOLLARS			ERGY OLLARS	TOTAL SAVINGS
4126	2	134	\$794	Ø	Ø	\$0	\$794
4204	2	59	\$350	Ø	Ø	\$0	\$350
5222	2	367	\$2,172	Ø	0	\$0	\$2,172
5234	2	246	\$1,457	Ø	0	\$0	\$1,457
5460	2	463	\$2,735	0	Ø	\$0	\$2,735
5470	2	473	\$2,799	Ø	Ø	\$0	\$2,799
5474	2	33	\$198	Ø	Ø	\$0	\$198
6008	2	71	\$419	Ø	Ø	\$0	\$419
6048	2	12	\$70	0	0	\$Ø 	\$7 0
TOTALS		1858	\$10,994	Ø	Ø	\$Ø	\$10,994
TOTAL MBT	U =	1858	THERMAL +	0 E	LECT. =	1858	TOTAL MBTU

ENGINEERING CONSULTING RESOURCES, INC. Consulting Engineers 4609 South 2300 East, Salt Lake City, Utah, 84117 (801) 277-7879

REF: PROJ #6 DATE: AUG 1987 PROJECT: PROJECT #6 FUNDING = LOW COST/NO COST

BY: CMY

DESCRIPTION:

PROJECT #6 : INFRARED OIL FIRED HEATERS

BLDG. #	ECO #	CONSTRUCTION COST	CONTRACT COST	TOTAL COST
5470	18	\$137,885	\$16,546	\$154,431
TOTALS		\$137,885	\$16,546	\$154,431

ENGINEERING CONSULTING RESOURCES, INC. 4609 South 2300 East, Salt Lake City, Utah, 84117 (801) 277-7879

Consulting Engineers

REF: PROJ #6 DATE: AUG 1987 PROJECT: PROJECT #6 FUNDING = LOW COST/NO COST

BY: CMY

DESCRIPTION:

PROJECT #6 : INFRARED OIL FIRED HEATERS

	LOW COST.	/NU CUST					
BLDG. #	EC0 #	THERMAL MBTU	ENERGY DOLLARS	ELEC		NERGY DOLLARS	- TOTAL SAVINGS
5470	18	1983	\$11,725	13966	48	\$1,234	\$12,959
TOTALS		1983	\$11,725	13966	48	\$1,234	\$12,959
TOTAL MBT	ſU =	1983	THERMAL +	48 EI	LECT. =	2031	TOTAL MBTU

PROJECT: PROJECT #7 FUNDING = LOW COST/NO COST

REF: PROJ #7 DATE: AUG 1987

BY: CMY

DESCRIPTION:

PROJECT #7 :LIGHTING, MOTOR & COOLER CONTROLS, CAULKING AND 10W/NO WEATHER STRIPPING, POOL COVER & INFRARED HEATING

BLDG. #	ECO #	CONSTRUCTION COST	CONTRACT COST	TOTAL COST
1010	48	\$12,009	\$1,441	\$13,450
. 1012	50	\$337	\$40	\$377
1020	50	\$172	\$21	\$192
2032	60	\$103	\$12	\$115
3096	26	\$4,224	\$507	\$4,730
4010	3	\$1,762	\$211	\$1,973
4010	18	\$42,372	\$5,085	\$47,457
4110	43	\$57,445	\$6,893	\$64,338
4120	43	\$76,814	\$9,218	\$86,032
4132	60	\$206	\$25	\$230
4233	3	\$931	\$112	\$1,043
5111	26	\$6,973	\$837	\$7,810
5111	46	\$13,870	\$1,664	\$15,534
5222	26	\$7,684	\$922	\$8,608
5236	13	\$3,960	\$475	\$4,43
5236	48	\$13,637	\$1,636	\$15,273
5236	55	\$9,787	\$1,174	\$10,96
5314	26	\$13,659	\$1,639	\$15,29
5326	. 55	\$5,788	\$695	\$6,48
		\$271.732	\$32,606	 \$304,338

REF: PROJ #7

PROJECT: PROJECT #7 ***PAGE 2*** DATE: AUG 1987

BY: CMY

DESCRIPTION:

PROJECT #7 :LIGHTING, MOTOR & COOLER CONTROLS, CAULKING AND LOW/NO WEATHER STRIPPING, POOL COVER & INFRARED HEATING

				
		CONSTRUCTION	CONTRACT	TOTAL
BLDG. #	ECO #	COST	COST	COST
	* * * * * * * *			
SUBTOTAL	PREV PAGE	\$271,732	\$32,606	\$304,338
			#23D	\$2,134
5438	55	\$1,905	\$229	ΦZ,134
5450	3	\$4,141	\$497	\$4,638
				e7 701
5474	13	\$3,019	\$362	\$3,381
TOTAL PAG	9ES 1 & 2	\$280,797	\$33,693	\$314,490

REF: PROJ #7

PROJECT: PROJECT #7 FUNDING = LOW COST/NO COST

DATE: AUG 1987

BY: CMY

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PROJECT #7 :LIGHTING, MOTOR & COOLER CONTROLS, CAULKING AND WEATHER STRIPPING, POOL COVER & INFRARED HEATING

BLDG. #	ECO #		ENERGY DOLLARS	ELEC	TRICAL E	ENERGY DOLLARS	TOTAL SAVINGS
					~		
1010	48	129	\$765	25608	87	\$847	\$1,612
1012	50	Ø	\$0	1655	6	\$55	\$55
1020	50	Ø	\$Ø	827	3	\$27	\$27
2032	60	Ø	\$0	449	2	\$15	\$15
3096	26	194	\$1,149	Ø	. 0	\$0	\$1,149
4010	3	35	\$209	Ø	Ø	\$0	\$209
4010	18	1180	\$6,979	3871	13	\$128	\$7,107
4110	43	1644	\$9,719	-50598	-173	(\$1,675)	\$8,044
4120	43	3760	\$22,229	-106735	-364	(\$3,532)	\$18,697
4132	60	0	\$Ø	936	3	\$31	\$31
4233	3	19	\$113	Ø	Ø	\$0	\$113
5111	26	347	\$2,052	0	Ø	\$0	\$2,052
5111	46	246	\$1,453	Ø	Ø	\$0	\$1,453
5222	26	278	\$1,641	Ø	0	\$0	\$1,641
5236	13	Ø	\$0	20849	71	\$883	\$883
5236	48	197	\$1,164	12768	44	\$423	\$1,587
5236	55	0	\$0	32771	112	\$1,567	\$1,567
5314	26	347	\$2,052	Ø	Ø	\$0	\$2,052
5326	55	0	\$Ø	12257	42	\$792	\$792
SUBTOTAL	THIS PAGE	8377	\$49,525	-45342	-155	(\$439)	\$49,086

PROJECT: PROJECT #7

PAGE 2

REF: PROJ #7 DATE: AUG 1987

BY: CMY

DESCRIPTION:

PROJECT #7 :LIGHTING, MOTOR & COOLER CONTROLS, CAULKING AND LOW/NO WEATHER STRIPPING, POOL COVER & INFRARED HEATING

BLDG. #	ECO #	-THERMAL MBTU	ENERGY DOLLARS			ENERGY DOLLARS	TOTAL SAVINGS
SUBTOTAL	PREV PAGE	8377	\$49,525	-45342	-155	(\$439)	\$49,086
5438	55	Ø	\$0	6384	22	\$308	\$308
5450	3	121	\$715	Ø	0	\$Ø	\$715
5474	13	0	\$Ø	5924	20	\$ 389	\$389
					<u>, </u>		
TOTAL PA	GES 1 & 2	8498	\$50,240	-33034	-113	\$258	\$50,498
TOTAL MB	TU =	8498	THERMAL +	-113	ELECT. =	8385	TOTAL MBTU